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10/006,329	12/06/2001	Stephen Mark Keating	450110-03719	9870

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EXAMINER	
KRONENTHAL, CRAIG W	

ART UNIT	PAPER NUMBER
2623	

DATE MAILED: 12/17/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/006,329	KEATING ET AL.	
	Examiner	Art Unit	
	Craig W Kronenthal	2623	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-25 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-25 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 06 December 2001 is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date 12/06/01, 09/09/02.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 7-9 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Regarding claim 7, the phrase "or the like" renders the claim(s) indefinite because the claim(s) include(s) elements not actually disclosed (those encompassed by "or the like"), thereby rendering the scope of the claim(s) unascertainable. See MPEP § 2173.05(d).

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 1-4, 11, 14, and 16-25 are rejected under 35 U.S.C. 102(e) as being anticipated by Wakasu (PN 6,259,8014).

Regarding Claims 1, 16, 19, 22, 23, 24, and 25: Wakasu discloses an image processing apparatus operable to embed data into an image, said image comprising a frame of image data (Fig. 1, 101), said frame comprising first and second image fields (Fig. 1, 102) [The image frame (101) is broken up into plural blocks of data (102) (col. 7 line 67) representing plural fields. Also the size of the blocks of data are given as j x k (col. 7 lines 39-40) which means this size can be adjusted to create a desired number of fields.], said apparatus comprising:

- A combining processor (Fig. 1, 104) operable to represent said data to be embedded (Fig. 1, 106) in a transform domain form [The electronic watermark data inserter (104) acts as the combining processor to embed watermark data stored in an electronic watermark data table (106) into the transform domain form of the image data (col. 5 lines 48-53).], and, in combination with a transform processor (Fig. 1, 103), to combine said data to be embedded with at least one of said first and second fields of said image in one of
    - A transform domain form, said transform processor (103) generating a transform domain form of said first and second fields, said data being combined with said first and second fields by said combining processor in said transform domain. The DCT transformer (103) generates a transform domain form of each field or block of data (102) selected from the image data (101) (col. 5 lines 48-53).

or

- A spatial domain form of said at least one of said first and second fields, said transform processor (103) generating a spatial domain representation of said transform domain form of said data to be embedded (106), said data being combined with said at least one of said first and second fields of said image by said combining processor in said spatial domain (col. 5 lines 48-53). The DCT transformer (103) also converts the data into a spatial domain form. This is inherent in all DCT transformations.
- Wherein said transform domain provides a plurality of sub-bands and said data to be embedded is introduced into at least one of said sub-bands of said at least one of said first and second fields of said image (col. 5 lines 48-53). It is inherent in the DCT transformation (103) that each j x k block of data (102) is transformed into a plurality of coefficients. Each coefficient represents a sub-band and since the DCT transformation (103) takes place before the watermark insertion (104) then it is inherent that the watermark data (106) is inserted into at least on of these coefficients.

Regarding Claims 2 and 17: Wakasu discloses an image processing apparatus as claimed in claim 1, wherein said combining processor is operable to combine data to be embedded with a first sub-band of said first field, and to combine said data with a second sub-band of said second field of said image data in said transform or said spatial domain. It is inherent that the electronic watermark data inserter (Fig. 1, 104) combines watermark data (Fig. 1, 106) with at least one coefficient (coefficients act as

sub-bands) in each of the transformed blocks of data (102) (blocks of data act as fields). These coefficients may or may not be the same depending on the watermark data (106) selected to be added.

Regarding Claim 3: Wakasu discloses an image processing apparatus as claimed in claim 2, wherein said first sub-band and said second sub-band comprise mutually exclusive spatial frequency components. It is inherent in the DCT transformation (Fig. 1, 103) that the coefficients, which are spatial frequency components, are mutually exclusive from each other. For example, for each block of data (Fig. 1, 102) there will be a set of coefficients output by the DCT transformer (103) including a DC coefficient and multiple frequency coefficients.

Regarding Claim 4: Wakasu discloses an image processing apparatus as claimed in claim 2, wherein said data embedded in said first sub-band includes first data and said data embedded in said second sub-band includes second data, said first and second data being different (col. 7 lines 39-55). Figure 3 shows the watermark data inserted in their respective fields. The field in column 1, row 1 has a first type of watermark data (1) and the field in column 2, row 1 has a second type of watermark data (2). In each field the respective watermark data is inserted into at least one coefficient (sub-band) as explained in the analogous arguments made in the last bullet regarding claim 1. Therefore since the watermark data are different it is possible for a coefficient (first sub-

band) in the first field and a coefficient (second sub-band) in the second field to be different.

Regarding Claim 11: Wakasu discloses an image processing apparatus as claimed in claim 1, wherein said data is formed into first and second data sets, and said combining processor is operable to introduce said first and second data sets into said at least one of said first and second image fields of said image frame respectively (col. 5 lines 46-50). The data consists of n data sets, which are stored in the electronic watermark data table (106), and therefore n=2 is a possibility. The combining processor (Fig. 1, 104) will insert the applicable data set into the blocks of image data (Fig. 1, 102).

Regarding Claims 14: Wakasu discloses an image processing apparatus operable to detect and recover data embedded into an image by the image processing apparatus according to claim 1, said apparatus comprising

- A data processor (electronic watermark data extractor, Fig. 2, 204) operable to identify at least one of first and second fields of said image into which data has been embedded (col. 6 lines 6-8).
- A transform processor (DCT transformer, Fig. 2, 203) operable to generate a transform domain representation of said at least one of the first and second fields into which the data has been embedded (col. 5 lines 61-66). The DCT transform (203) transforms all fields (blocks of data, Fig. 2, 202).

- A data detector (electronic watermark data detector, Fig. 2, 207) operable to detect and recover the data from said transform domain representation of said at least one of the first and second fields from the sub-bands into which the data has been embedded (col. 6 lines 11-16). The electronic watermark data detector (207) recovers the data from all fields (202) that are transformed (203) and extracted (204).

With regards to claims 18 and 20, arguments analogous to those presented for claim 14 are applicable to claims 18 and 20.

Regarding Claim 21: Wakasu discloses a signal representing an image in which data has been embedded by an image processing apparatus according to claim 1. This signal is represented by the watermark-inserted image (Fig. 1, 108). For process of embedding data, analogous arguments as presented for claim 1 are applicable to claim 21.

4. Claims 1, 6-10, 16, 19, 22, 23, 24, and 25 are rejected under 35 U.S.C. 102(e) as being anticipated by Hayashi et al. (PN 6,535,616). (hereinafter Hayashi)

Regarding Claim 1, 16, 19, 22, 23, 24, and 25: Hayashi discloses an image processing apparatus operable to embed data into an image, said image comprising a frame of image data (Fig. 1, 106 captured by component 112), said frame comprising first and second image fields (Fig. 2, output of 202) [The image frame data (106) is broken up

into plural blocks of data (output of 202) (col. 4 lines 57-64) representing plural fields. Also Hayashi discloses the block as being of a predetermined size (col. 4 lines 59-60) which means this size can be adjusted to create a desired number of fields.], said apparatus comprising:

- A combining processor (Fig. 1, 103) operable to represent said data to be embedded (Fig. 1, 107) in a transform domain form [The digital watermark embedding unit (103) acts as the combining processor to embed watermark data into the transform domain form of the image data (col. 4 lines 18-21).], and, in combination with a transform processor (Fig. 1, 102), to combine said data to be embedded with at least one of said first and second fields of said image in one of
    - A transform domain form, said transform processor (102) generating a transform domain form of said first and second fields, said data being combined with said first and second fields by said combining processor in said transform domain. The wavelet transforming unit (102) generates a transform domain form of each field or block of data (output of 202) selected from the image data (106) (col. 4 lines 65-67).

or

    - A spatial domain form of said at least one of said first and second fields, said transform processor (102) generating a spatial domain representation of said transform domain form of said data to be embedded (107), said data being combined with said at least one of said first and second fields of said image by said combining processor in said spatial domain (col. 4

lines 65-67). The wavelet transforming unit (102) also converts the data into a spatial domain form. This is inherent in all wavelet transformations.

- Wherein said transform domain provides a plurality of sub-bands (col. 4 line 65–col. 5 line 2) and said data to be embedded is introduced into at least one of said sub-bands of said at least one of said first and second fields of said image (col. 6 lines 5-12).

Regarding Claim 6: Hayashi discloses an image processing apparatus as claimed in claim 1, wherein said first sub-band in which said data is introduced into said first and second fields represents in said transform domain low spatial frequencies of said image in one direction and high spatial frequencies of said image in another direction, and said second sub-band in which said data is introduced in said image frame represents in the transform domain high spatial frequencies of said image in said one direction and low spatial frequencies of said image in said another direction (col. 5 lines 3-7 and 36-50). It is inherent in a wavelet transform that the sub-bands represent low spatial frequencies in one direction and high spatial frequencies in another. These inherent properties are demonstrated in Figures 3 and 4 and are the result of the high pass and low pass filters of the wavelet transformation unit (Fig. 1, 102) shown in Figure 2.

Regarding Claim 7: Hayashi also discloses an image processing apparatus as claimed in claim 1, wherein said transform processor (Fig. 1, 102) is operable in combination with said combining processor (Fig. 1, 103) to introduce said data to be embedded (Fig.

1, 107) into said image in accordance with the wavelet transform, of at least one of said data, said image frame and said at least one of said first and second fields, said wavelet transform providing said plurality of sub-bands (col. 4 line 65–col. 5 line 2).

Regarding Claim 8: Hiyashi discloses an image processing apparatus as claimed in claim 7, wherein said first sub-band into which said data is introduced into said at least one of said first and second fields has one of low vertical, high horizontal frequencies and high vertical, low horizontal frequencies sub-bands, and said second sub-band into which said data is introduced into said image frame is the other of said low vertical, high horizontal frequencies and high vertical, low horizontal frequencies sub-bands (col. 5 lines 42-50). These are inherent features resulting from wavelet transformation.

Regarding Claim 9: Hayashi discloses an image processing apparatus as claimed in claim 8, wherein said data is introduced into said sub-bands in a scan direction, said scan direction being in the same direction in the sub-band as the direction of the low spatial frequencies of the image (col. 6 lines 41-62). The trees are sent in succession, so the embedding process is done in the scan direction. Furthermore, this scan direction is in the direction of the low spatial frequencies of the image because the minimum range sub band (LL) is separated out by separating circuit (Fig. 5, 501) and the S605 (Fig. 6) embeds the data into this minimum range sub band which represents the low frequencies as denoted by the (LL).

Regarding Claim 10: Hayashi discloses an image processing apparatus as claimed in claim 1, comprising a modulator operable to modulate a Pseudo Random Symbol Stream with each of the data symbols to be embedded, said modulated Pseudo Random Symbol Stream being introduced into said transform domain representation (col. 15 lines 28-37). The random number generator modulates the coefficients, which are the image data in the transform domain representation, with a Pseudo Random Symbol Stream.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wakasu in view of Tewfik et al. (PN 6,226,387). (hereinafter Tewfik)

Regarding Claim 5: Wakasu discloses an image processing apparatus as claimed in claim 2 having data in two sub-bands, but does not disclose the data being the same. However, Tewfik discloses a scene-based video watermarking using wavelet transformation wherein said data embedded in said first sub-band and said data embedded in said second sub-band are the same data (col. 6 lines 46-50). Tewfik explains that the frames of a scene are embedded with a consistent watermark. Tewfik

then continues to explain how these frames are wavelet transformed forming sub-bands (wavelet frames) (col. 6 lines 52-56). Therefore two sub-bands (wavelet frames) may be embedded with the same watermark. It would be obvious to one of ordinary skill in the art to modify Wakasu according to the teachings of Tewfik because it offers another alternative use of plural watermark data. Furthermore, one would be motivated to make this modification to resolve pirate attacks as expressed by Tewfik (col. 6 lines 58-59).

7. Claims 12 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wakasu.

Regarding Claim 12: Wakasu discloses an image processing apparatus as claimed in claim 11. Wakasu does not disclose the image processing apparatus wherein said data comprises data items, each data item and a copy of said each data item forming said first and said second data sets respectively. The examiner takes official notice that the first data set may be a watermark and that the second data set may be a copy of that watermark. It would be obvious to one of ordinary skill in the art to modify Wakasu's electronic watermark data table (Fig. 1, 106) because it is common to repeatedly watermark the same copyright information. Furthermore, one would be motivated to make this modification because the more times information is embedded the easier it is to detect that information.

Regarding Claim 13: Wakasu discloses an image processing apparatus as claimed in claim 12, wherein said data items to be embedded include meta data such as a Unique Material Identifier (UMID). Wakasu discloses the embedded watermark data as possibly being information capable of identifying an author (col. 1 lines 52-55), which includes meta data such as a UMID.

8. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wakasu in view of Satoh et al. (PN 6,175,639). (hereinafter Satoh)

Regarding Claim 15: Wakasu discloses an image processing apparatus as claimed in claim 14. Although Wakasu discloses the recovery of watermarked data (see analogous arguments made regarding claim 14), it does not disclose the forming of a composite signal from the recovered data. However, Satoh does disclose a digital decoding system wherein a data detector is operable to combine first signals representative of the first data set recovered from said sub band in said image fields, with second signals representative of the second data set from said other sub-band in said image frame to form a composite signal from which said data items are recovered. Satoh's adder (Fig. 10, 1050) receives 8x8 blocks of data, which each represent the extracted data set from a specified field, and adds the blocks together to form an image (screen) (col. 20 lines 42-45). It would be obvious to one of ordinary skill in the art to modify Wakasu according to the teachings of Satoh to combine the recovered data because it will reduce deterioration in the detection results. One would be motivated to

make this modification to display the composite detection results for colored watermarks.

Conclusion

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

- Manjunath et al. (PN 6,332,030) is cited for teaching a method of embedding and extracting digital data in images using both DCT and DWT.
- Cox et al. (PN 5,991,426) is cited for teaching a field based watermark insertion and detection method using DCT.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Craig W Kronenthal whose telephone number is (703) 305-8696. The examiner can normally be reached on 8:00 am - 5:00 pm / Mon. - Fri..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amelia Au can be reached on (703) 306-6604. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

12/13/04
CWK

MEHRDAD DASTOURI
PRIMARY EXAMINER

Mehrdad Dastouri